



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Alaska Fisheries Science Center
Resource Assessment and Conservation Engineering Division
7600 Sand Point Way Northeast
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Seattle, Washington 98115-0070

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F/AKC2:HHZ

CRUISE RESULTS

Charter Vessels:

F/V Northwest Explorer, Cruise 2001-01, Slime Bank, southern Bering Sea

F/V Ocean Harvester, Cruise 2001-01, Slime Bank, southern Bering Sea,
Cruise 2001-02, Shumagin Islands, Gulf of Alaska

F/V Sea Storm, Cruise 2001-01, Kodiak Island, Gulf of Alaska

AREA AND PERIOD OF OPERATIONS

The Alaska Fisheries Science Center (AFSC) conducted a winter bottom trawl survey within selected areas of Steller sea lion critical habitat (SSLCH) in the southeastern Bering Sea and Gulf of Alaska during February and March, 2001. Three fishing vessels, the *Northwest Explorer*, *Ocean Harvester*, and *Sea Storm*, were chartered to complete trawl samples within the three selected areas. From February 16th to March 1st the *Northwest Explorer* and *Ocean Harvester* surveyed the Slime Bank area north of Unimak Island (Figure 1). After exchanging scientists in Dutch Harbor, the *Ocean Harvester* transited to the Gulf of Alaska and conducted survey operations from March 2nd through March 15th in the Shumagin Islands region (Figure 2). The *Sea Storm* conducted survey operations on the east side of Kodiak Island from February 9th to March 8th (Figure 3).

ITINERARY

9 February	<i>Sea Storm</i> begins charter in Kodiak, AK. Begin survey in Kodiak area.
16 February	<i>Northwest Explorer</i> and <i>Ocean Harvester</i> begin charter in Dutch Harbor, AK. Begin survey in Bering Sea.
22-23 February	<i>Sea Storm</i> crew exchange, Kodiak, AK



1 March	<i>Northwest Explorer</i> off-load gear, end charter, Dutch Harbor, AK
1-2 March	<i>Ocean Harvester</i> crew exchange, Dutch Harbor, AK. Begin survey of Shumagin area.
8 March	<i>Sea Storm</i> off-load gear, end charter, Kodiak, AK.
15 March	<i>Ocean Harvester</i> off-load gear, end charter, Dutch Harbor, AK.

OBJECTIVES

The primary objective of the winter survey is to provide information on the relationship between Pacific cod, (*Gadus macrocephalus*), walleye pollock, (*Theragra chalcogramma*), and Steller sea lions within the SSLCH. The initial 2001 survey effort resulted in distribution and absolute abundance estimates for Pacific cod and walleye pollock within selected areas of SSLCH and provided an assessment of the feasibility of conducting future winter bottom trawl surveys.

SURVEY DESIGN AND METHODS

The survey area includes portions of the SSLCH in the southeastern Bering Sea, Shumagin Islands and Kodiak Island. The survey design is a stratified random sampling scheme. The Bering Sea and Shumagin Islands survey areas are divided into two sampling strata based on the expected distribution and abundance of Pacific cod while the entire Kodiak survey area was sampled at a uniform sampling density. In the Bering Sea, 22 stations were scheduled for the highest sampling density stratum (7,765 km²) with an additional 11 stations located further offshore in the low sampling density stratum (12,112 km², Figure 1). In the Shumagin Islands region, 7 stations were assigned within the relatively small high density sampling stratum (2,631 km²) and another 9 stations to the remaining low density sampling stratum (10,279 km², Figure 2). Thirty-six first priority stations were scheduled for the Kodiak Island area, (13,639 km², Figure 3). Additional sampling locations (shown on the charts as priority two stations) were also scheduled for sampling with the final number dependent on the time remaining after completing the first priority stations.

All regularly scheduled survey tows were conducted during daylight hours. Each vessel conducted 15 minute trawl hauls at preassigned stations. All fish and commercially important invertebrates were sorted, weighed, and enumerated by species. Biological information

including lengths, individual weights and maturity observations were taken for Pacific cod and walleye pollock. Stomach samples were collected for target species including Pacific cod.

Temperature and depth were recorded at each station with a micro-bathythermograph attached to the trawl headrope. Net mensuration devices and a bottom contact sensor were used to monitor and record net configuration and performance parameters during each tow.

VESSELS AND GEAR

All three charter vessels are house-forward trawlers with stern ramps, multiple net storage reels (mounted forward of the working deck and/or aft over the stern ramp), telescoping deck cranes, propeller nozzles, and paired, controlled-tension hydraulic trawl winches with 1,280 m to 2,190 m of 2.54 cm diameter steel cable. The *Sea Storm* is 38 m in overall length (LOA) and powered by single, 1,710 continuous horsepower (HP) main engine. The *Ocean Harvester* is 33 m LOA and propelled by a 1,250 HP main engine. The *Northwest Explorer* is 49 m LOA and is equipped with two 1,800 HP engines. Each vessel carried a full complement of state-of-the-art navigational and fishing electronics including Global Positioning Systems (GPS) with video position plotters, radars, color video fish-finders, and recording depth sounders.

The vessel operators were Captain Steve Bransititer of the *Sea Storm*, Captain Johan Mannes of the *Ocean Harvester* and Captain Shawn O'Brien of the *Northwest Explorer*.

Standard RACE Division Poly-Nor' eastern high opening bottom trawls, rigged with roller gear, were used exclusively for sampling the selected survey stations. Gear specifications of the standard trawl included: a 27.2 m headrope with twenty-one 30 cm diameter floats, and a 24.3 m, 1.3 cm diameter longlink alloy chain "fishing line" attached to a 24.9 m, 0.95 cm diameter 6 x 19 galvanized steel wire footrope. The roller gear is 24.2 m long and constructed of 1.9 cm diameter 6 x 19 galvanized steel wire rope and 36 cm rubber bobbins separated by a solid string of 10 cm rubber disks. In addition, 5.9 m wire rope extensions with 10 cm and 20 cm rubber disks were used to span each lower flying wing section.

Survey trawls were constructed of 12.7 cm stretched-mesh polyethylene web with a 3.2 cm stretched-mesh nylon liner in the codend. Accessory gear for the Noreastern trawl includes triple 54.9 m, 1.6 cm diameter galvanized wire rope dandyline, and 1.8 X 2.7 m steel V-doors weighing approximately 850 kg each.

RESULTS

All first priority stations were completed in each of the three survey areas. In the Slime Bank survey area of the southeastern Bering

Sea, a total of 39 good performance tows were completed in the high density sampling stratum and another 19 stations were completed in the low density stratum for a total of 58 stations. In the Shumagin Islands survey area, a total of 10 stations were completed in the relatively small high sampling density stratum and another 14 stations in the low sampling density stratum for a total of 24 stations. In the Kodiak survey area, all 36 first priority stations were completed along with an additional 48 secondary stations for a total of 72 stations. Some pre-assigned stations were not sampled due to unsuitable bottom conditions. In cases where trawlable bottom could not be found at a given station, a pre-selected alternate location was sampled.

Sea surface temperatures and bathythermograph recordings were collected at nearly every trawl site. In general, bottom temperatures were higher than sea surface temperatures and both surface and bottom temperatures increased from west to east with the lowest temperatures occurring in the Bering Sea and the highest in the Kodiak area. In the Bering Sea survey area, sea surface temperatures ranged from 1.9° C to 4.8° C and averaged 3.5° C while bottom temperatures ranged from 3.6° C to 4.6° C and averaged 4.1° C. Temperatures were higher in the Shumagin survey area with sea surface temperatures ranging from 4.1° C to 4.9° C (averaging 4.4° C) and bottom temperatures from 4.4° C to 5.7° C (averaging 4.8° C). In the Kodiak area, temperatures were the warmest, with sea surface temperatures ranging from 2.4° C to 5.7° C (averaging 4.6° C) and bottom temperatures from 4.4° C to 6.1° C (averaging 5.2° C).

Bering Sea survey area

Walleye pollock accounted for 60,268 kg (79%) of the 76,724 kg total Bering Sea catch and had the largest single catch, 12,507 kg, of any species. Pollock occurred in 57 of 58 tows and 16 catches, distributed throughout the survey area, ranged from 1,000 kg to 5,500 kg. Pollock averaged .75 kg in weight and 45.1 cm in length.

Pacific cod, appearing in 57 of 58 catches and with a total catch of 5,086 kg, was the second most abundant species in the survey area. The largest catch was 549 kg while a total of 16 catches were greater than 100 kg. Cod averaged 1.89 kg in weight and 49.3 cm in length.

Other species or groups with relatively high abundance included arrowtooth flounder (4,090 kg), northern rock sole (2,451 kg), flathead sole (1,065 kg), Pacific halibut (932 kg), jellyfish (573 kg), skates (410 kg), sculpins (321 kg) and rex sole (261 kg).

Shumagin survey area

Pacific cod were the most abundant species in this region, accounting for 5,548 kg or 45 percent of the total species catch.

Cod were captured in 14 of the 24 successful tows with two catches (2,303 kg and 1,212 kg) from the low density sampling stratum representing 63 percent of the total Shumagin cod catch. Pacific cod averaged 3.67 kg in weight and 63.7 cm in length.

Walleye pollock were taken in 18 of 24 trawl hauls for a total catch of 1,280 kg. Only four catches, ranging in size from 105 kg to 428 kg, exceeded 100 kg. Pollock averaged .84 kg in weight and 44.4 cm in length.

Other important components of the Shumagin catch included arrowtooth flounder (3,299 kg), flathead sole (689 kg), Pacific halibut (464 kg), southern rock sole (210 kg), skates (195 kg), rex sole (137 kg), Pacific sleeper shark (101 kg) and eulachon (94 kg).

Kodiak survey area

Flatfish represented 78 percent of the 29,234 kg total Kodiak region catch. Arrowtooth flounder with 14,150 kg accounted for 62 percent of the flatfish catch and 48 percent of the total species catch. Other important components of the flatfish catch were flathead sole (5,143 kg), Pacific halibut (1,272 kg), and southern rock sole (750 kg).

Walleye pollock represented less than 10 percent of the total species catch. With a mean weight of .23 kg and mean length of 21.1 cm, catches consisted mainly of age 1 fish. Appearing in 66 of 72 hauls, pollock were widely distributed throughout the survey area. Only one haul exceeded 100 kg, a 1,838 kg catch consisting predominantly of adults, averaging 45.4 cm in length.

Other species or groups encountered in the Kodiak region included skates (628 kg), eulachon (325 kg), sculpins (187 kg) and Pandalid shrimp (116 kg).

SCIENTIFIC STAFF

Winter 2001 Winter Survey of the Bering Sea and Gulf of Alaska

All scientific staff are from either the RACE and REFM Division Programs located at the Alaska Fisheries Science Center in Seattle, WA, or the Kodiak Fisheries Research Center in Kodiak, AK.

Sea Storm, Leg 1

Kodiak

Feb 9-22

FPC Nate Raring
Eric Brown
Dennis Benjamin
Ron Payne
Alisa Abookire

Ocean Harvester, Leg 1

Bering Sea

Feb 16- Mar 1

FPC Dan Nichol
Erika Acuna
Bill Floering
Elaina Jorgensen
Keith Smith

Northwest Explorer, Leg 1

Bering Sea

Feb 16- Mar 1

FPC Robin Harrison
Deb Nebanzahl
Larry Haaga
Geoff Lang
Troy Buckley

Sea Storm, Leg 2

Kodiak

Feb 23- Mar 8

FPC Lyle Britt
Dennis Benjamin
Rich MacIntosh
Claire Armistead
Liz Chilton

Ocean Harvester, Leg 2

Shumagin Islands

Mar 2- Mar 15

FPC Bill Flerx
Destry Wion
Jay Orr
Chris Johnston
Mei-sun Yang

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Table 1. Total catch (kg) of selected species or species groups encountered during the 2001 winter bottom trawl survey of Steller Sea Lion Critical Habitat in the Bering Sea, Shumagin Islands and Kodiak Island regions.

Species or species group	Bering Sea	Shumagin	Kodiak
Pacific sleeper shark	0	101	0
salmon shark	0	0	75
spiny dogfish	0	0	35
Skates	410	195	628
arrowtooth flounder	4,090	3,299	14,150
Kamchatka flounder	32	0	0
Greenland turbot	64	0	0
Pacific halibut	932	464	1,272
flathead sole	1,065	689	5,143
english sole	0	0	64
Dover sole	2	2	59
rex sole	261	137	354
yellowfin sole	22	0	195
starry flounder	28	0	145
northern rock sole	2,451	0	272
southern rock sole	0	210	750
butter sole	44	8	162
Alaska plaice	3	0	114
Pacific sand lance	0	0	0
sablefish	149	6	31
Pacific herring	0	0	0
sculpins	321	32	187
Pacific tomcod	0	0	9
Pacific cod	5,086	5,548	1,813
walleye pollock	60,268	1,280	2,814
Atka mackerel	13	0	0
eulachon	9	94	325
capelin	0	0	1
rougheye rockfish	0	12	43
Pacific ocean perch	112	36	1
dark dusky rockfish	0	6	0
light dusky rockfish	0	0	11
black rockfish	0	2	2
northern rockfish	0	9	2
redstripe rockfish	0	0	0
harlequin rockfish	0	0	0
jellyfish	573	0	1
Pandalid shrimp	1	5	116
crabs	17	2	80
giant octopus	56	0	18
squid	49	0	1
others	666	128	359
Total Catch	76,724	12,264	29,234

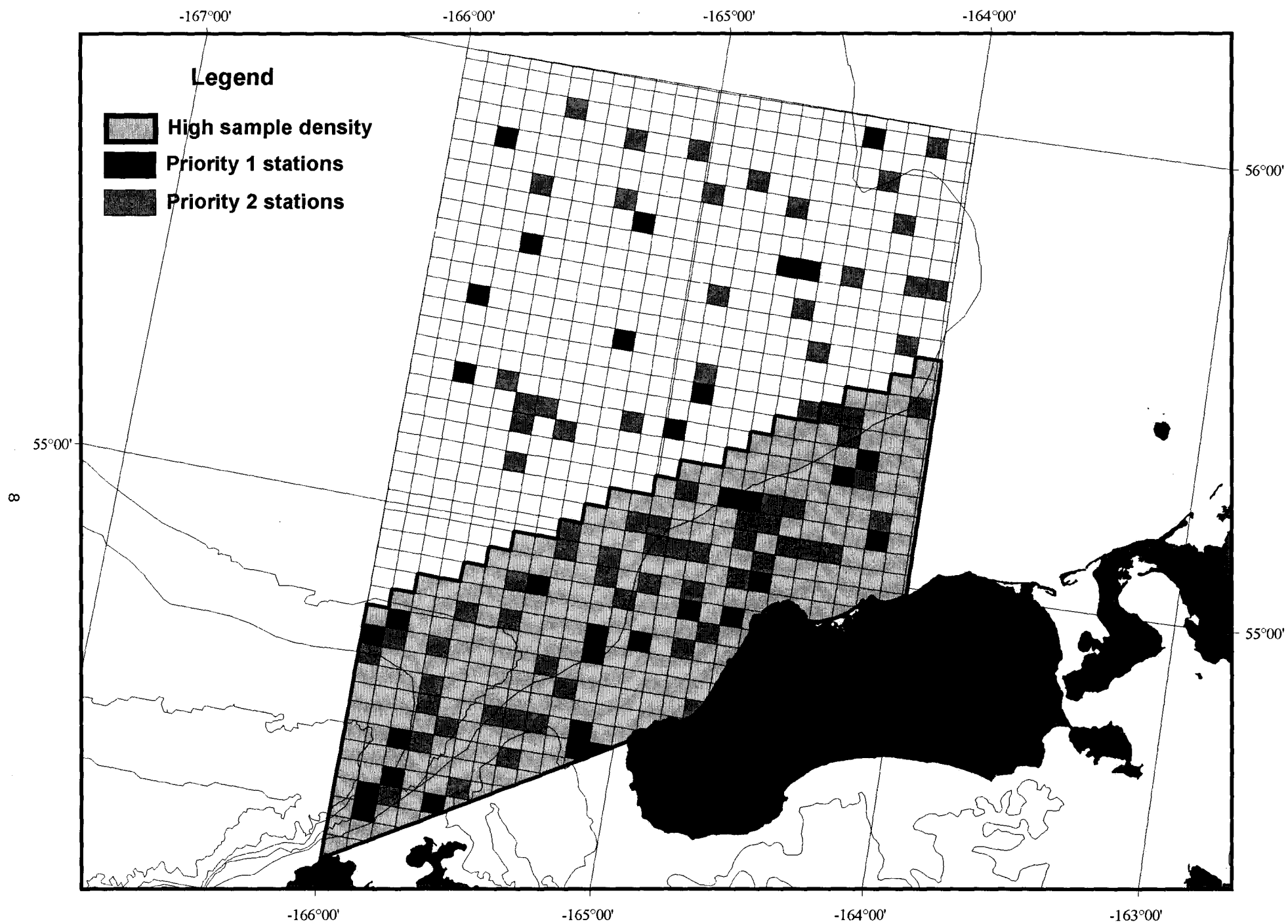


Figure 1. Primary and secondary stations assigned to the chartered fishing vessels Northwest Explorer and Ocean Harvester during the 2001 winter bottom trawl survey of the southeastern Bering Sea region.

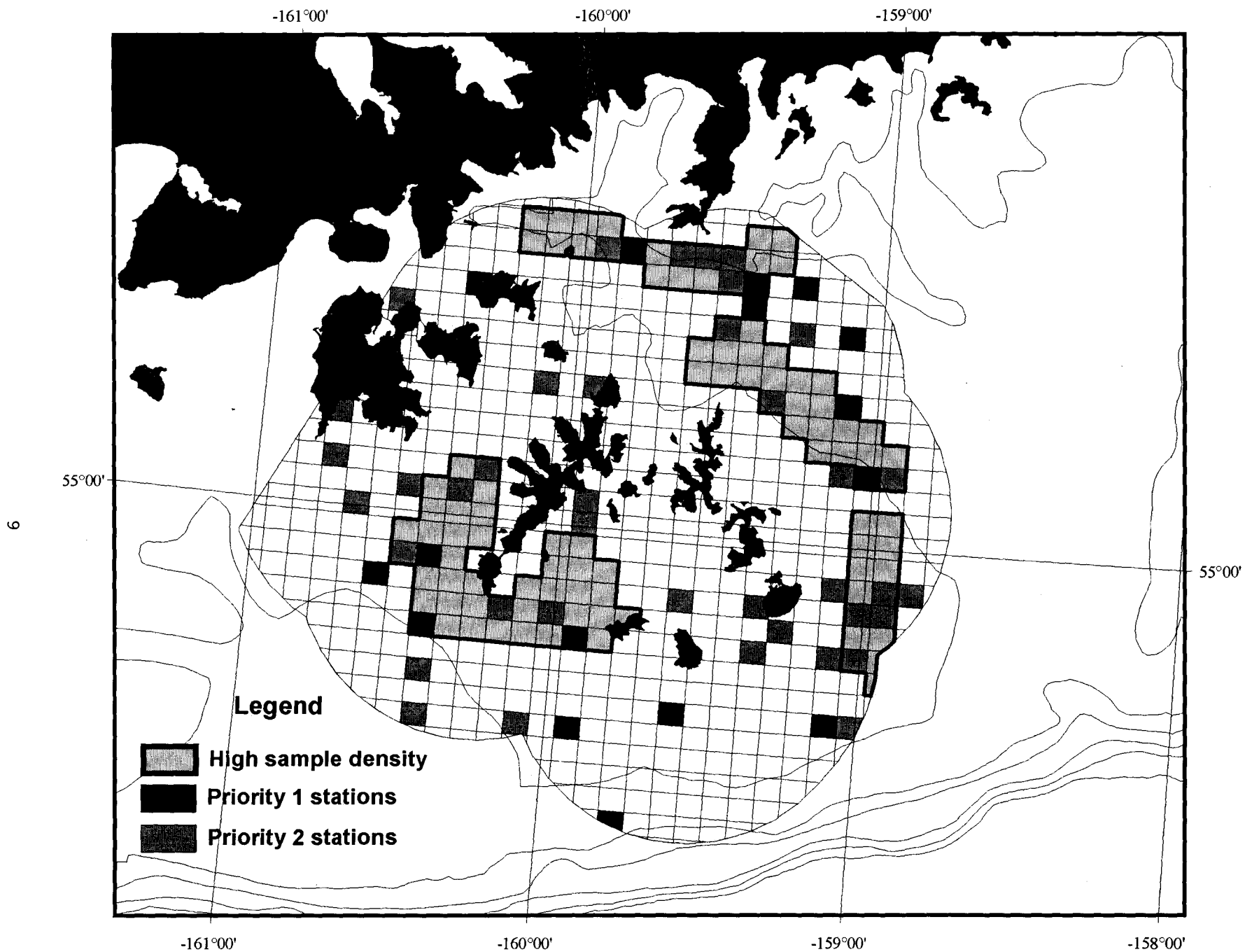


Figure 2. Primary and secondary stations assigned to the chartered fishing vessel Ocean Harvester during the 2001 winter bottom trawl survey of the Shumagin Islands region.

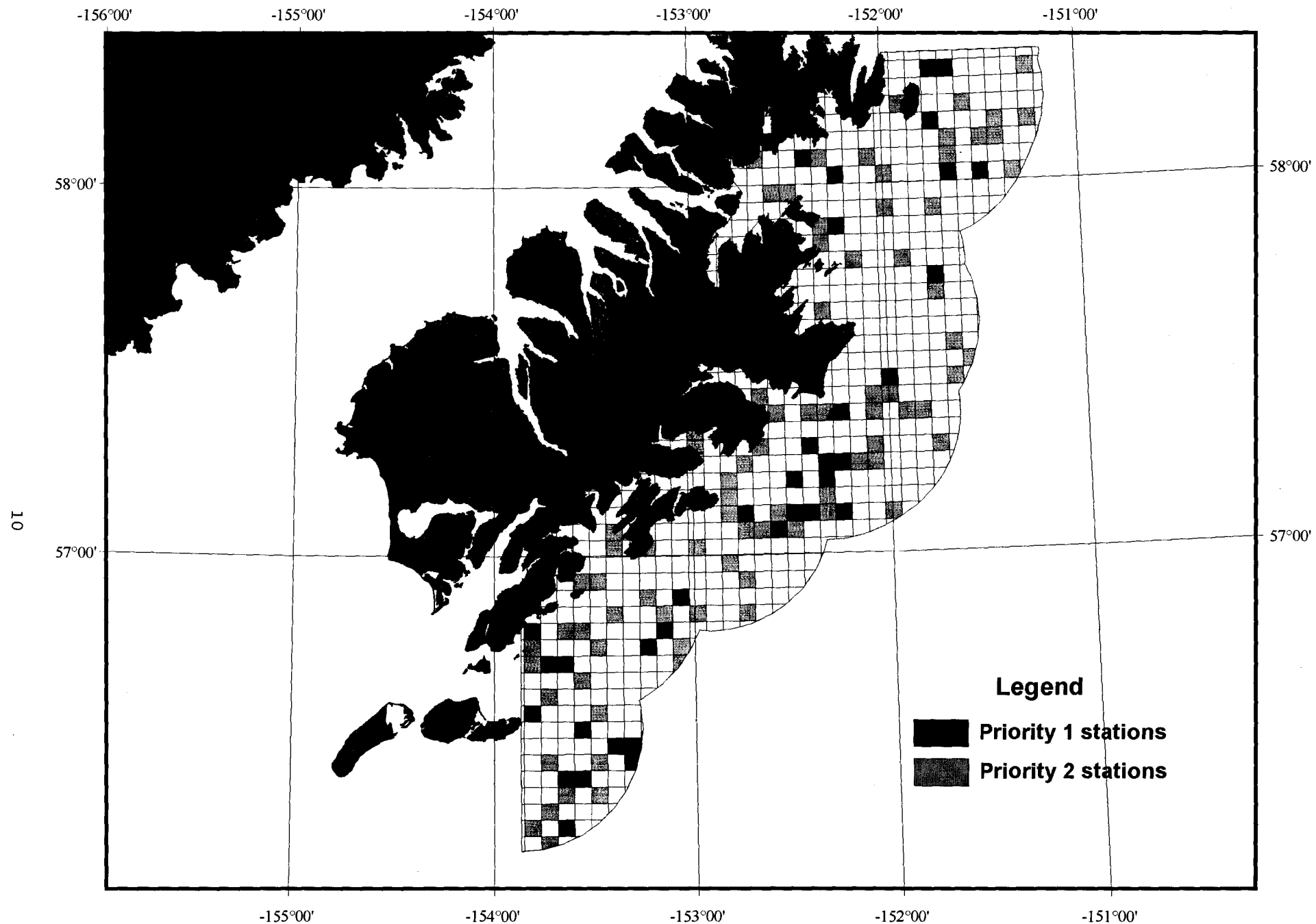


Figure 3. Primary and secondary stations assigned to the chartered fishing vessel Sea Storm during the 2001 winter bottom trawl survey of the Kodiak Island region.